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SOME  
OBSERVATIONS  
ON THE  
MENTAL STATE  
OF THE  
BLIND, AND DEAF, AND DUMB,  
SUGGESTED BY  
THE CASE OF JANE SULLIVAN,  
BOTH  
BLIND, DEAF, DUMB, AND UNEDUCATED.

BY  
*Richard*  
R. FOWLER, M.D., F.R.S.

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Gift of  
John Owen,  
of Cambridge.

**TO**

**DR. HOWE,**

**THE SAGACIOUS AND SUCCESSFUL INSTRUCTOR**

**OF**

**LAURA BRIDGEMAN.**



## P R E F A C E.

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MUCH in the following pages was suggested by observations made on a young woman, deaf, dumb, and blind, in the workhouse at Rotherhithe, a few weeks before the meeting of the British Association at Plymouth.

What I had then learned respecting her was read to the Members of the Medical Section.

A second visit to her, in the summer of last year, furnished me with a few further particulars; and these also were communi-

cated to the Medical Section of the British Association at Manchester. Some physiological observations have been since added.

Should the subject excite as much interest in the minds of those who may take the trouble to read what I now submit to them, as it has long held in mine, results may be produced, which, if I live, I shall read with avidity, and no doubt with instruction, whether they concur with or invalidate the conclusions at which I have arrived.

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The following abstracts of the two papers read to the British Association were printed in their Reports for the years 1841 and 1842:—

1841. “ Some observations of a case of

deafness, dumbness, and blindness, with remarks on the muscular sense: by Dr. Fowler.

“ The case was that of a young woman in the Rotherhithe workhouse. She was born deaf and dumb, and blinded by small-pox when three years old. She is now about twenty, and does not hear the loudest efforts of the voice, but starts on a poker held by a string against her ear being struck against a grate, or when her nurse stamps on the boarded floor.

“ Touch was the only sense which others used for communicating with her, or that she employed in examining persons or objects. She possessed both taste and smell, but did not appear to have used them.

“ Until the age of 14 or 15, her existence appeared merely animal. But then a marked difference took place in her habits. She became as attentive to dress and per-



sonal decorum as any other girl. She feels her way, without a guide, to every part of the workhouse, recognises all its inmates by the feel of their hands, makes her bed, and sews not only plain work, but even the more intricate parts of dress. She is very tenacious of what she deems her own, and was much pleased with a shilling which was put into her hand—smiling, curtseying, and feeling it eagerly for some time afterwards. The author deems the true key to so much and so minute information derived from touch alone to be the development of the muscular sense, and of the reciprocal influence of the adjustments of the different organs of sense on each other, by which all the exquisite attainments of the artisan, the musician, the sculptor, the painter, and even the orator, are regulated.

“ Several instances were given of the

existence and functions of this sense in the lower animals, and practical suggestions given for its application in educating the deaf and dumb, particularly when these defects are complicated with blindness." Read to the British Association, at Plymouth, 1841, by R. F.

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1842. "Further particulars respecting a young woman deaf, dumb, and blind, of whom a full account was given last year, at Plymouth. By Richard Fowler, M. D., of Salisbury.

"In consequence of Mr. Tyrrel's attention to her eyes, and syringing her ears, she can now get a glimpse of shining objects on the floor—a shilling; can catch a ball on its cup, be made sensible of the return of Sunday

by counting her fingers, and putting her hands and knees in the attitude of prayer. She starts at loud sounds, and expresses pleasure at the sound of a Jew's-harp, between her teeth. By such exercises of the senses, and constant communications by touch with two young girls, both her intelligence and comfort have been improved.

“ Now, as our thoughts are expressed by muscular adjustments, and as these reciprocally excite thoughts, ideas, similar to those they express, is there not reason for hope, that, by the frequent exercise of the muscles, some pleasurable thought may be excited, even in minds as torpid as this poor girl's?”

ON A CASE  
OF  
DEAFNESS, DUMBNESS, AND  
BLINDNESS.

---

I AM about to submit to the notice of this Section the case of a young woman in the Rotherhithe workhouse, who was mentioned to me about a month ago by some gentlemen attached to the Kent-road Asylum for the Deaf and Dumb, as having been born deaf and dumb, and who was blinded by the small-pox, when only three years of age. She is now about twenty years old. Her eyes were examined about two years since by Mr. Tyrrell, whose skill and competency as an oculist, to do what might be most advisable for a case like this, must be known to many gentlemen present. He found that one eye

was quite disorganised. In the other, the lens was opaque, and the state of the iris was such, that he did no more than puncture with a fine needle the capsule of the lens, and so left it to be disposed of by the aqueous humour and the absorbents. She never has been able to distinguish objects of sight, nor is there any evidence of her seeing excepting shrinking back whenever a hand was waved between her eye and the light. She gave no sign of hearing the loudest efforts of the voice, but shrank back when a poker (held by a string to her ears) was swung against a grate, or struck with the back of a large knife, and also when the nurse, who attends her, stamped on the boarded floor on which she stood. She probably heard the sound from the poker, but might merely have *felt* the vibrations excited by the stamp (as most of us have *felt*, as well as *heard*, the vibrations of the deck of a steam-boat).\* I have often

\* It has been satisfactorily ascertained, that dumbness in similar cases is not from organic defect of any part of the structure employed in speaking, but is owing to the impossibility of making the requisite ad-

felt vibrations over the whole of my trunk from the bass notes of a powerful organ, and have been informed by competent judges, that two ladies, impenetrably deaf, have expressed unequivocal pleasure, by intelligent looks, and moving their hands quickly all over their persons, whenever music producing strong vibrations gratifying to their feelings was played. In the experiments made by Dr. Wollaston on Mr. Cross's wild animals, it may be a question whether their inattention to all notes of the organ but those of the bass was owing to the vibrations felt, or the resemblance of the sounds to those of prey attempting to escape.

I once asked a deaf and dumb boy of 15, how he knew that he made sounds audible to others (when repeating the Lord's Prayer,

justments by willing the appropriate actions of the muscles of the larynx, tongue, lips, &c., for want of hearing to regulate them. I found a boy, about eight years of age, in the Asylum for the Deaf in Exeter, who, not having been born deaf, had recently lost his hearing. In consequence of this, his speech was in a transition state, from having lost the assistance of his ears to adjust his organs of speech.

for instance). His written answer (pointing to his throat) was, that he felt vibrations, through muscular sense, which he had been assured were productive of sounds audible to others.

Touch seemed to be the only sense by which others communicated with the subject of this Paper, or which she herself employed in examining the persons or things that came in her way. She seemed pleased while sniffing the fragrance of a flower, and tasting some sweetmeats which I gave her ; but never had been observed to employ the sense of smell (as Mitchell, the blind, deaf, and dumb boy, whose case was so philosophically investigated by my revered friend and instructor, the late Professor Dugald Stewart), or the tip of her tongue and teeth in the examination of any object which excited her attention. The sensible and observant mistress of the work-house told me that a very marked change in her whole deportment took place at the age of fourteen or fifteen. Till then, her existence seemed merely animal. From that time she has been as attentive to dress and

personal decorum as any other girl, and even more attentive to the arrangement of her hair, which was clean, well brushed, and combed, and neatly disposed. She always carries her own brush and comb in her pocket. This I am inclined to think is instinctive in the female character. The final cause is obvious—

“ My mother bids me binds my hair.”

She feels her way without a guide to every part of the workhouse, and recognises all its inmates by the feel of their hands and clothes. She makes her bed, and can sew, not only plain work, but sleeves and the more intricate parts of dress; and is angry when stockings, shoes, or any other article is given to others, and not equally to her. She is very tenacious of what she considers as peculiarly her own, and seemed as much gratified as any other poor person would have been with a shilling,\*

\* Having learned from Mr. Collier, who lectures on the Deaf and Dumb, that at Portsmouth there was a poor uneducated woman (Gill, upwards of forty years of age, the daughter of a waterman) who has been deaf, dumb, and blind from childhood, and who was said to have this mental peculiarity—that when money



which I put into her hand—smiling, curtesying, and feeling it eagerly for some time after.

At the time Mr. Tyrrell operated on her eye, she had for her constant companion a girl of eight years old, who had so perfectly

is given her she lays it on the mantel-piece, to which she returns in about an hour ; but, instead of being pleased at finding it still there, is angry if it have not been taken away—I wrote to my intelligent friend, Major Willes, of the Royal Marines, and begged him to see her, if possible, and send me all the well-authenticated particulars he could collect. The following is an extract from his letter, dated Portsmouth :—

“I went to the Star and Garter Inn, and in the presence of the respectable landlady examined the sister of the poor woman, who is the subject of your inquiry. Her enjoyment of good health is the reason why none of the medical men here knew any thing of her. The only surgeon who ever attended her, and that when young, is dead. She had some small vision until seven or eight years of age—enough to carry her clear of large objects, and to avoid danger. The story of the money is as it has been stated, although I thought it would have been quite the reverse. Her power of distinction and memory from the touch is most remarkable. If any articles are out of their usual place she appears uneasy. Her sister (who supports her), having been absent two years, came to see her. After feeling her with her hands for some time, she recognised, and kissed her. She readily distinguishes clothes, whether new or old, good or bad, fine or coarse, and by a par-

found the key of her mind, that by the slightest touch she awakened the conception of whatever she wished to communicate, and with which she instantly complied.

It may assist our apprehension of this variety of intimations, communicated by touches so slight, when we reflect on those we in all our movements receive from the muscular sense,\* by which my hand at this moment is directed, and by which all the adjustments of the artisan, the musician, the

ticular sort of sound through the nose indicates her approval or disapproval accordingly. I have not the slightest doubt of the truth of these statements; and I find that Mr. Collier, who lectures on such subjects, had seen her."

This strange exception to a law of mind I hope to have an opportunity of further investigating. The law which prompts us to will the end (self-preservation) prompts us also to will the means.

" You take my house, when you do take the prop  
That doth sustain my house; you take my life,  
When you do take the means whereby I live."

*Merchant of Venice.*

\* The elephant has in his muscular sense a natural sign of want of firmness in ground to support his weight. This observation is from a gentleman (Mr. Elliott) long resident in India. Horses and mules passing the Alps feel before they tread.

sculptor, and even the orator are regulated in the modulation of his voice and gesture. The slightest touch of the whisker (a real hair-trigger) \* of a reposing cat, or any of the feræ, and probably on the tentaculæ of animals much lower in the scale of being, suffices to rouse into a state of tension and preparation for action the adjusting muscles of every organ of sense. Yet in the nerves

\* Nerves have been distinctly traced into the bulbs of the whiskers of seals, and I think, too, in some of the feræ. There are satisfactory preparations of these in the Museum of the College of Surgeons, kindly shown me by Professor Owen. If a feather be swept lightly over the fine down of the cheek, a sensation of irritation so intolerable will be excited, that we instinctively and roughly rub the part till it is allayed. This may assist those inattentive to the strong effects of apparently slight causes in apprehending the intimations of near objects communicated to the blind by vibrations of the air.

“ Time has been, my senses would have cool’d  
To hear a night-shriek, and my fell of hair  
Would, at a dismal treatise, rouse and stir,  
As life were in it.”

*Macbeth.*

When the sensibility of these nerves is morbidly acute we express it by hair-sore, Horrepilatio, Plica Polonica, &c.

which convey these intimations not the minutest change could be detected by any of our senses. I laid the phrenic nerve of a dog (just killed) on the field of a powerful microscope, but could not detect any change in it, while the diaphragm contracted convulsively whenever the upper end of the nerve was touched with silver and zinc. I have repeated the same experiment since with the crural nerves of frogs, and with the same result.

All who hear me must have observed, that comatose persons cannot be fed without danger of suffocation, till the adjusting muscles of the mouth, tongue, and pharynx have been excited to their appropriate action by rubbing the lips with a spoon. Every fibre of our body, and every motion of the mind, probably, has its key of re-transmission, and the problem to be solved in our intercourse with the deaf, dumb, and blind, is how to place our touch so as to make them responsive. I found in the year 1793, that I could re-excite the suspended contractions of the heart, whether in or out of the body of a frog or cat, by the application of zinc and silver to

its external surface, after every mechanical and chemical stimulus had been tried in vain. Dr. Read, in an able paper read last year at Glasgow, and Sir H. Cooper, by experiments performed in Guy's Hospital, proved that fresh oxygenated blood was the appropriate excitator of the internal surfaces of the heart and brain, when the beating of the one and the vitality of the other had been artificially suspended. Even without contact, a sense of tension may be excited between the eyebrows by alternately advancing and withdrawing any metallic points. Those of scissors seldom fail to produce a strong sensation on persons under 30. I need not remind you of the tremendous effects produced by apparently slight causes in the instances of malaria, contagious diseases, inoculation with scarcely-perceptible particles, fainting from an odour, and fever from the fragrance of hay.

Confining the observation to touch only, I have seen the most rapid touch of letters embossed for the use of the blind read by the tiny fingers of children scarcely out of infancy, and their intelligence thus excited

nearly as readily and correctly as ordinary print would have been read and apprehended by children of the same age, whose sight was perfect.

But the touch is not the only sense which becomes more cognisant of its appropriate objects when other media of communication are obstructed.

A deaf and dumb teacher, at the Kent-road Asylum, interpreted accurately every movement of Mr. Watson's lips, while that gentleman was deliberately and very articulately giving him directions. I know a young lady, deaf and dumb, who collects the meaning of her sister before half the requisite expressions of the finger-alphabet can have been made, and who is so expert at reading off the motions of the lips, that her mother is obliged to hold her hand before her face whenever she has occasion to speak of her to another.\*

\* " To train the *intellect* merely to impart knowledge to the blind, is comparatively an easy task ; for so doth the soul thirst for knowledge, that it will attain it even when half its avenues are blocked up. And a sponge placed in water will not more certainly imbibe

Mons. Itard exercised the adjusting muscles of the ear by varying the notes of a large bell. In a paper I read last year to this Section at Glasgow, it was stated, that, without adjustments of the organs of sense, we have no distinct sensations, and that these adjustments are made by the muscular sense.

it, than will the mind of man take in a knowledge of the conditions and relations of things with which his body is surrounded. If the eye be obstructed, the ear opens wider its portals, and hears your very emotions in the varying tones of your voice. If the ear be stopped (deaf), the quickened eye will almost read the words as they fall from your lips; and if both be close sealed up, the whole body becomes like a sensitive plant. The quickened skin perceives the very vibrations of the air, and you may even write your thoughts upon it, and receive answers from the sentient soul within."—*Dr. Howe's Report of the Boston Asylum for the Blind*, 1841.

The pupils in the Manchester Asylum for the Blind are always aware of their approach even to a lamp-post. One can tell by the vibrations excited by ordinary respiration, if a person, however still, is sitting in a room which he enters, can catch a person running, and knew even a change of slippers. One pupil, aged 30, blind at three years of age, and quite blind during the last seven years, sees flashes when the eyes are pressed. Some cannot find their way when they have the pressure of a bandage on their eyes. Does this

We adjust both the voice, the eye, and the ear to the distances at which sounds are to be heard and objects seen.

Most deaf people hear better a clearly-articulating voice, when time is given for the adjustment of the ear, than the loudest voice

prevent the adjustments sequent on touch by muscular sense? Some see a vivid light in the dark. Another pupil, aged 25, was asked, "Do you dream of light and colours?"—the answer was, "Not of more than I had seen before." This pupil is quite blind, and can hear the bubbling of a burning candle. I saw two young women in South Wales, one of whom had received instruction at the Asylum for the Deaf; another had remained at home, and could neither read, talk with her fingers, nor write a single letter, yet she was incomparably the most intelligent, and was, as a dress-maker, so superior to her sister, that her labour supported the family. In her the muscular sense seemed affected by the slightest vibrations of a tuning-fork.

Dr. Howe says, he has known blind boys go into a menagerie, and acquire a more correct idea of the size, shape, and habits of animals than most seeing boys would. They mount the camel, and feel the elephant. Julia Brace, blind, deaf, and dumb, in the Asylum at Hartford (U. S.), after a short excursion on board a steamer, had learned more of its structure and arrangements, and described them more accurately, than any of those who had accompanied her, though their organs of sense had no defect.



when less articulate—analogous to darkness from excess of light. The late Mr. John Kemble, when asked how he contrived to make himself so well heard in so large a theatre, answered, by not letting one word trip up the heels of another.

I am satisfied, that what is called dulness of hearing and apprehension, happens more frequently from sluggish and imperfect adjustment than from diminished sensibility, particularly in those who are uneducated, or have unpractised ears. The first question to a peasant proves seldom more than a flapper to rouse the torpid adjustments of his ears. The invariable answer of a Scottish peasant is, “What’s your will?”—that of the English, a vacant stare. A second and even a third may be required to elicit an answer. The slightest consideration of this subject will satisfy those who have to address mixed multitudes of the necessity of a deliberate and articulate enunciation.\*

\* Mons. Texier, who was esteemed to read French better than any person of his day, recommended, in his printed Instructions, to lay the accent on the *mot de force* only in every sentence.

Having lately again seen the young woman, Margaret Sullivan,\* living in the Rotherhithe workhouse, of whom I communicated to the members of this section at Plymouth all the facts I had then been able to glean, I found her intelligence improved since last year, and she immediately recognised me, when it was intimated to her that I was the person who had then made her acquaintance. Since last year, probably by exercising her ear with the Jew's-harp—her eyes, by gleams of light from a mirror—her muscular sense, by playing

\* In the interval between the visit of the last and the present year, I received a note from Mr. Johnson, the medical attendant of the Rotherhithe workhouse, of which the following is an extract:—

“The early history of this case is very obscure. It is probable, at the age of four years, she had small-pox, at which period, it is said, she was in possession of all the senses—and from this time she became deaf, blind, and dumb. It would appear, she recollects the precise period at which she was deprived of these faculties. Since the kind attention which Mr. Tyrrell paid to her case, about four years ago, she has been enabled to see partially, and also to hear very loud noises. I think she might be taught to read the embossed print without much difficulty.”

with the cup and ball—her touch and memory, by acquiring knowledge of her companions—investigation of false and true, of which she had a quick perception—liking and dislike of persons, in ratio of kindness (referable to the law of self-preservation)—and desire of distinction. In reference to the touch, she plays, counts leaves of books, sews, knows all the girls, and counts six on her fingers—then kneels and clasps her hands, in the attitude of prayer, to indicate Sunday—and still washes and combs her hair.

Though Mr. Tyrrell had, by some improvement of the pupil of one eye, enabled her to distinguish light from darkness, she did not, when I before saw her, seem to discern the outlines of objects—but now she evidently not only saw the gleam of light from a shilling on the floor, but, directed towards it by one of her companions (an intelligent girl of nine or ten years old), could so adjust the movements of her eye and hand, at the distance of four or five feet, as to reach towards and pick it up. She has means of distinguishing all the inmates of the workhouse, and readily

obeys every intimation from her kind master and mistress. She did not for a year recover her cheerfulness, after the death of a favourite girl (eight years of age); but has since formed a friendly intercourse with two other young girls, and they seem perfectly to understand each other.

I hardly need advert to the well-known fact, that the human animal does not come into the world with an instinctive facility of adjusting the movements of the muscles even of his arms and legs, much less of the muscles by which the organs of sense are directed to their several objects by appropriate adjustments. The infant has to learn these, and is years in acquiring them. But if for the purposes of the sportsman, or of the arts of painting or sculpture, the difficulty of the acquisition is to the majority of our species all but insuperable. But this poor girl has all the requisite adjustments of eyes and ears still to learn. The most intelligent of the born blind have seen little more when newly couched than the confused light of objects, and have had to acquire the power of adjust-

ing their eyes before they could distinguish the defined outline of their several parts, even of forms so little complicated as the triangle, the square, and the circle.

Sir Everard Home's boy could not distinguish a triangle at first sight, but was obliged to look at each angle separately before he was aware that there were three, and three only. Thus, too, persons (whose organs of sense are perfect) are quick in perception in proportion to the facility with which they can make the adjustments of the sense employed. Hence persons much advanced in years are, as I have before observed, dull of hearing and of sight, more from loss of tone in the adjusting muscles than from loss of sensibility of the sentient nerve. Cicero has evinced great acuteness in his observation on the unnecessary obscuration of intellect in the aged: "*Manent ingenia senibus modo permaneant studia et industria.*" But as the adjustments of each of the organs of sense is required to regulate the adjustments of the muscular sense of other parts, the deaf are necessarily dumb. When Beethoven became

deaf, he could no longer so adjust his hands, as to play intelligibly on his violin.

An acute boy, of eight years, whom I saw in the Asylum for the Deaf at Exeter, and to whom I have referred in a note at the foot of the second page, had not become deaf till after he had been able to read with great distinctness: but at the time I saw him he was fast becoming dumb from want of hearing to regulate the adjustments of his organs of speech. He read the beginning of a page with tolerable distinctness; but, as he proceeded, the sounds did not express words, and all was soon confused and indistinct.

“ A gentleman, about sixty years of age, had been totally deaf nearly thirty years. He appeared to be a man of good understanding, and amused himself with reading, and by conversing either by the use of the pen, or by signs made with his fingers to represent letters. I observed, that he had so far forgotten the pronunciation of the language, that, when he attempted to speak, none of his words had distinct articulation, though his relations

could sometimes understand his meaning; but, which is much to the point, he assured me that in his dreams he always imagined that people conversed with him by signs or writing, and never that he heard any one speak to him. Hence it appears, that with the *perceptions* of sound, he has also lost the *ideas* of them. The organs of speech still retain somewhat of their usual habits of articulation. This observation may throw some light on the medical treatment of deaf people, as it may be learnt from their dreams whether the auditory nerve be paralytic, or their deafness be owing to some defect of the external organ. It rarely happens that the immediate organ of vision is perfectly destroyed.\*”

Two men, who had been some years blind,—one from *gutta serena*—the other from loss of the whole substance of his eyes, told Dr. Darwin they did not remember ever to have dreamt of visible objects since the total loss of their sight.

Richard Bright, aged 68, became blind during a fever, attended with a sense of weight

\* Dr. Darwin's *Zoonomia*, vol. i. p. 22.

in his head and long delirium, for which he was blistered on the back of the neck. Has seldom dreamed since, and only three times of the light of the sun and stars and sunshine. Has perfect memory of these, and of things and places he had seen, and these are recalled, as visual, by his touch. But of the sensation of these touches, by which visual objects are recalled as if in his eyes, he has no reiteration—no memory. The touch of a table, chair, stick, or his Bible, which it is his chief amusement to con over in his mind, recalls the visual table, chair, stick, or Bible, which he had seen before he became blind. But these sensations of touch, after he has ceased to feel them, he cannot by any effort of his will recall.\*

No sensation of a flash of light was excited, as it invariably is in those whose eyes are perfect, by placing broad pieces of zinc and silver inside his cheeks, and bringing them in contact.

From this instance, and that of another

\* “ We cannot raise any sensation in our minds by willing it.”—*Dr. Reid on the Mind*, p. 77.



still older man, who has not been blind more than five years, and who can recall the most vivid conceptions of past scenes, persons, and things, I think I may infer, that, although the retina has lost its sensation of light, the adjusting muscles retain their power of reiterating the adjustments of long bygone sensations, by which the perceptions of memory are excited in the mind.

“ There is a sensation by which we perceive a body to be hard or soft. But it is one thing to have the sensation felt on pressing the hand on a table, and another to attend to it, and make it a distinct object of reflection. The first is easy—the last difficult. We are so accustomed to use the sensation as a sign, and to pass immediately to the hardness signified, that, as far as appears, it was never made an object of thought, either by the vulgar or by philosophers. Nor has it a name [*i. e.* the sensation of hardness] in any language. There is no sensation more distinct or more frequent; but it is never attended to, but passes through the mind instantaneously, and serves only to introduce

that quality in bodies, which by a law of our constitution it suggests. \* \* \* \* I think it probable that the novelty of this sensation will procure some attention to it in children at first. \* \* \* \* Thus, when one is learning a language, he attends to the sounds; but when he is master of it, he attends only to the sense of what he would express.\*”

Those who had the use of their eyes long enough to have adjustments of vision habitually associated with those of touch, find the visual spectrum recalled by touch, but cannot by a volition (whatever may be the efforts and mental attention exerted) recall the sensation of touch.

But the instance of Laura Bridgman (so well recorded by Dr. Howe), making words by the finger-alphabet in her dreams; the muscular efforts of dogs in their dreams, and those of which we ourselves have a sort of sleeping consciousness, while trying in a dream to escape from a bull; but, more convincing, the actual muscular movements of somnambulists; the twitching in amputated

\* Reid on the Mind, pp. 103, 106.

legs referred to the long-felt ulcerated feet—all seem to indicate, that, although we cannot recall the mere sensation of touch at the ends of our fingers, yet we have the reiteration of the muscular sense of feeling, and can, like Laura, recall this when we attend intensely to such evanescent feelings.

If the ends of our fingers have lain long in unheeded contact with a book, table, or other surface, we are not conscious of any sensation of touch till we move them. If, then, Dr. Reid's observation\* be confined to passive touch, his opinion of the fact is confirmed by all whom I have asked to attend to this feeling.

For example, when the organs of sense are let to stand at ease, as it were, when the tension of its muscles required for its adjustments are relaxed, and the drum of the ear unbraced, we have little or no sensation, and consequently no definite perception of any surrounding object. While the eye is bent

\* "The mind is partly active, partly passive in sensation. \* \* \* \* I can think of the smell of a rose, even when the rose itself is not present."—*Dr. Reid on the Mind*, p. 38.

on vacancy, or glancing heedlessly on passing objects, we do not see definite outlines till we look—and we must look and look again, before we can see such accurate relations of parts to the whole of an object as will make a faithful sketch of what we would impress on our memory. If we do not listen, the ear does not hear. The fingers may touch, but if they do not move over the surface and outlines with ever-varying pressure, they do not examine and, consequently, do not feel all they require to know. And those who have noticed the nostrils of a hound while tracing a scent, or an epicure while flavouring his wine, will be satisfied that this necessity of accurate adjustment for accurate sensation and perception is equally true of all our senses.

Now, by a law of our constitution—and I believe this law will be found inherent in all animals—the adjustments of all our organs of sense reciprocally influence each other through the medium of the muscular sense. For example, when sitting over a book we hear the rumbling of wheels on gravel made

by a coach; it suggests the visual coach—when we feel our way in the dark, the several objects touched suggest their visual appearance. Richard Bright, who had seen till he was eleven years old, tells me he has as distinct a visual perception of the street and houses and of their relative situation in his native city, as any one who has the aid of sight to guide him.

Dr. Howe remarks, that Laura Bridgeman not only goes from room to room, but with unerring certainty puts her hand to the knob by which it is opened at the moment she is within the proper distance.

Dr. Brown, in his Lectures on the Philosophy of the Mind, says, if the finger be alternately passed quickly and slowly over the same surfaces, while our eyes are closed, we shall estimate the distance of the edge of a book or table to be longer when the finger has moved slowly, than when it has moved quickly. This is an easy and satisfactory confirmation of the fact, that time is an element in our measure of space [extent], as the watch and sun-dial are proofs of the

converse of this, that time is measurable by extension (see Appendix).

While making some galvanic experiments on the senses, to furnish materials for a work on Animal Electricity, which I published in the year 1793, I discovered a test of easy application to ascertain the remaining excitability of the retina. By placing a piece of zinc foil on the tongue and a silver rod high up the nostril, and bringing them into contact, a flash of light was observed, and at the same time a contraction of the iris. I have tried this experiment on the eyes of the blind in the Asylums both at Bristol and Manchester, and have ascertained with tolerable exactness any degree of excitability that still remained in the retina (see Appendix).

Analogous to this, we often cannot hear the words of a chant till we have seen them in a book. When, therefore, both the senses of sight and hearing have been long in abeyance, all attempts to improve them should be assisted by such appropriate exercise as will rouse the mind to attempts at adjustment. With this view, metals and mirrors, which

reflect strong light, may be often put within the field of vision ; and a Jew's-harp, music-box, bell, or tuning-fork or poker held by a string to the ears, and struck sharply with the back of a knife, may afford convenient tests of the state of the organ, and awaken trains of thought in minds torpid from deficient excitement.

Cases of deafness, dumbness, and blindness appear to me to admit of more alleviation than parents, and even professional men, are aware of; IF *attended to* when FIRST observed. Mons. Itard says, that not more than (I quote from memory) one-fifth of the supposed deaf are quite so ; and that many might be rescued by an early and sifting examination. In some of the *few* dissections recorded, no malformation was detected. In the adult cases examined by Mr. Cline, Dr. Heighton, and others, the labyrinth was filled with a cheesy matter, instead of an aqueous fluid. The importance of attending to our secretions is now recognised by all medical men. I have noticed the quickened apprehension which immediately succeeded womanly de-

velopment in the Rotherithe girl, the principal subject of this communication. Suspecting that the dulness of hearing, of sight, and, in fact, of all our senses may in part be owing to diminished action of minute arteries subservient to structure and secretion, I have, for the last twenty years, been in the habit of advising those dull of hearing to freely and frequently excite the membrane of the meatus externus with an iron, or rather steel, ear-picker. A healthy secretion is thus kept up, and, probably, extended to the membrane of the labyrinth. This, therefore, I have earnestly recommended to Margaret Sullivan. If she can be induced by the kind persons who have the care of her steadily to persevere in the daily practice of thus exciting the secretions of her ears, I still hope her hearing may be further quickened.

Richard Trimbee, the son of a poor widow in Salisbury, five years of age—all but deaf and dumb, was a healthy, well-grown child till the seventh month, when he had the measles severely, followed by excruciating pain and the gradual enlargement of the head. I



then saw him for the first time. He lay in a state of stupor, with dilated pupils, the parietes of the abdomen flat, and as if adhering to the back-bone. The bones of the head were not closed, and two large tumours, with distinct fluctuation, projected from its fore and hinder parts.

I gave small doses, daily, of mercury and chalk, and kept the head wet with cold water, saturated with salt. His drink was a solution of cream of tartar and sugar. The tumours gradually subsided, and he became a healthy child, but was perceived to be impenetrably deaf and dumb. I advised that he might be encouraged to play in the fields, and that his head should still be kept wet with salt and water, and frequently rubbed with a rough towel. At two years of age, the circumference of his head was still  $23\frac{1}{2}$  inches. As the external opening to the ear was in a natural state, I aimed at promoting the secretions of wax by stimulating its membrane. As the mother had reduced a swelling in front of her neck by frequently rubbing it with some very acrid dripping, she readily

complied with my request, to put some daily in the ears of her child, and prick them with an iron ear-picker. By the continued use of these means, and various contrivances to excite the sensation of sound, he can now hear several words spoken loudly and articulately by his mother, and the sounds he hears he *tries to imitate*.

I give this case as equally in a state of transition with that of the eight-year-old boy in the Asylum at Exeter, but in the reverse direction. The Exeter boy was becoming dumb, because he was deaf; Trimbee is beginning to speak, because he is beginning to hear.

Trimbee is at this time (June 23, 1843) five years old. He is a plump, well-grown, healthy, active, and intelligent child. His head now measures only  $20\frac{1}{2}$  inches in circumference, but is still nearly an inch and a half larger than that of a brother—stout, healthy, and eight years old.

Still further to show the dependence of the adjustments of the muscles employed in speech on the sensibility of the ear, a poor widow, now 54, had eight children; with some she

had epileptic fits during her pregnancy. These all died. With others, she was free from fits. By her falls her head was so much bruised, that still, at the distance of twenty years, she suffers severe pains at times, and is so deaf, that few of her neighbours can make her hear; yet her articulation is perfect. The circumstance to which I wish to direct the attention of the reader is the fact, that she hears her own voice as distinctly as ever (though nearly deaf to all external sounds), and this suffices to regulate her articulation.

The effect on the condition of horses, by exciting healthy action in the minute arteries of the surface of the body, is well known to most people.

The late Mr. Grosvenor, of Oxford, and my friend, Mr. Carpue, extended this practice most successfully to the torpid and stiffened limbs of their patients. My own conviction of the utility of thus exciting local arterial action was confirmed by the following experiment, which I published in the year 1793:—

Having divided the crural nerve of a frog,

I left it for weeks. No stimuli then excited its muscles to contract but zinc and silver, applied to the cut end of the nerve. The contractions were very feeble; but after brushing the skin over the muscles, they contracted as vigorously as those of the leg whose nerve had not been divided.

It is, therefore, through the media of branches of the fifth pair of nerves, by re-transmission, that I hope so to invigorate minute arterial action in the ears of Margaret Sullivan as to produce a healthy secretion of aqueous fluid (see the Appendix) in the labyrinth, and the repair of such parts as may have been but slightly disorganised by disease.

The severest long-continued case of tic-doloureux, in all the branches of the fifth pair of nerves, that I have seen, was cured by washing the head frequently with cold water. Another case of severe neuralgia in the frontal branch of the fifth pair of nerves was suspended for more than a month by application of Dr. Granville's counter-irritant, whenever the returning pain was anticipated. On the death of the patient, a sensible man, of about

forty years of age, a malignant tumour was found in the small intestines.\*

I cite these cases to prove the reciprocal influence which the sentient extremities of branches of the fifth pair of nerves, and deeply-seated and often remote parts, have on each other.

In cases of apoplexy, epilepsy, hysteria, and convulsions, from whatever cause, I have invariably found the safest and most effective assistance from a small but continued stream of cold water, poured on the head.

Having found the general health of the boy Trimbee, of whose case some details are given in pages 29 and 30, perfectly restored, and that his ears are more sensible to sounds, and having reason to think that much of this has been effected by the continued application of salt and water to his head and neck, and by keeping up a secretion from the lining of the passage to the ear, I have urged the

\* The inferior maxillary nerve, or third branch of the fifth pair of nerves, before leaving the cranium, is joined, as the first and second divisions are, by a filament from the sympathetic nerve.

employment of similar means with this poor girl.

I was once called to a young man in a state of stupor, who was supposed to be dying from pressure on the brain. To relieve him from such long-accumulated secretions as might obscure the disease, a stream of the coldest water was poured over the lower part of his person, so that all accessible branches of the sympathetic nerve might be thus excited by its influence, to rouse into action the several cavities to which they are distributed. This succeeded so much beyond my expectation, that three hours afterwards I found him sitting upright, and answering promptly and rationally all the inquiries I had occasion to address to him.

If such copious affusions of cold water are thus influential in resuscitating the torpid energies of our frame in a state of disease, it is obvious that they cannot but be valuable aids, when discreetly applied, to preserve its healthy condition.

As a proof of the extent of the influence of the pointed steel ear-picker, moved

with as much pressure as can without discomfort be borne over the whole surface of the passage to the ear, I may observe, that I have again and again perceived a slight metallic taste, re-excited as often as the ear-picker was so applied to the inner surface of the ear.\* The minute arteries are thus brought into action by their exciting nerves.

Metallic taste may be more strongly excited by rubbing the internal surface of the nares and corners of the mouth with the polished surface of the steel blades of the tweezers.

Does not this afford an additional proof that the third branch of the fifth pair of nerves is the nerve of taste?

The sensation of the metallic taste may be still more distinctly excited by cutting the hairs within the nares and on the corners of

\* The late Sir Charles Bell has somewhere observed, that the taste of steel is excited by touching some of the papillæ of the tongue with the point of a needle. If attention be given to the sensation excited while cutting the hairs within the nostrils, not only will a metallic taste, but a strong metallic odour, be perceived.

the mouth slowly with scissars. But as perception is in the ratio of the sensibility of the nerves of a part, and this again in the ratio of the abundant or scanty supply of blood by its minute arteries, it is reasonable to infer, that we may increase the sensibility of a part by exciting its arteries to circulate the blood more rapidly.\*

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To myself, the principal interest excited by such a case as Sullivan's consists in the

\* I have frequently seen the circulation of the blood in the web of a frog's foot accelerated by touching the lower division of its crural nerve with zinc and silver. Every one must have felt the increased sensibility of a part from the accelerated circulation in inflamed parts. If the points of compasses, or scissars, about a quarter of an inch apart, be placed astride the closed lips (so abundantly supplied with blood), not only will these points be distinctly felt as two, but their distance from each other will be felt as if wider than will be recognised by the eye: whereas, if the points be placed on the cheeks, the two will be felt as one.

The late Dr. Wollaston (Phil. Trans.) has proved that there are sounds so little removed from silence as to be inaudible by some ears, though distinctly heard by others. This may be either from the more abundant



clew it seems to afford to unravel some part of the mysterious connexion between the mind and the body.

supply of blood to the auditory nerves of some persons, or from their power of more correct adjustment of their ears. From the instance of two points being felt as two on the lips whose nerves are copiously supplied with fresh oxygenated blood, while they are felt as one only on the cheek, and other parts less abundantly supplied, it is evident that the sensibility of a part is in proportion to the quantity and freshness of the arterial blood with which it is supplied. Most persons must have had opportunities of observing the paleness and insensibility of every part of the body during a fainting fit, when blood is no longer propelled to supply its nerves, and the instantaneous return of consciousness and sensibility when cold water dashed on the face has excited deep inspiration. By such inspirations fresh air is drawn into the lungs; the blood receives the supply of oxygen required to re-excite the arrested action of the heart, and by its action blood is again propelled to the surface of the skin, and the sentient extremities of its nerves are restored to life and sensibility. Sir A. Cooper found that he could successfully suspend and restore the vitality of any animal by alternately obstructing and leaving free the four large arteries by which the brain is supplied with blood, probably from its being the bearer of oxygen to the brain. Minute branches of these arteries ramify through every part of the soft substance of the brain, and are sustained in their course by a curiously-accompanying web of the pia mater. The late Dr. Macartney showed

It has been said, that there is nothing in the mind which has not passed to it through the senses;\* that the mind, like the table of me a beautiful preparation of this, made by himself from the foetal brain.

Where the health and organisation are in all other respects perfect, and still the ears do not distinguish the slighter gradations of sound—in short, in persons who have not a musical ear, I suspect the defect to be the want of power to make the requisite adjustments—analogous to defective articulation in many, where there is still no apparent defective structure in the organs of speech.

Berkley, in his Theory of Vision, has suggested that distance is measured by the contractility of the muscles adjusting the eyes for distinct vision. I may add, that it probably is by the reciprocal influence which adjusting muscles exert on each other through the medium of the muscular sense. This, I presume, may be attributable to the freer and more extended range of motion which the lips have, from their structure, and the exquisite sensibility by which their movements are excited—this sensibility being momentarily recruited by an abundant supply of fresh arterial blood.

\* “Nihil est in intellectu quod non prius fuerit in sensu.” Leibnitz, with deeper insight, added, “Nempe nisi intellectus ipse.” To this it has been objected, that we cannot say, that the intellect is in the intellect.

Dr. Price, in his Review of the Principal Questions in Morals, has this profound observation: “The power that understands, or the faculty within us which dis-

a camera obscura, receives all its evanescent imagery from the rays of light modified by the coil and the lens.

To the supposition of others, that the mind is as blank paper, and that all we find written upon it is by a hand foreign to the paper itself, Dr. Franklin sarcastically remarked, that there are varieties of paper, and that blotting-paper and foolscap are among the number. We have now, in Photography, an additional proof that the paper must be duly prepared to enable it to receive a distinct and permanent impression. Musical instruments of all kinds require that their vibrations should be awakened by something external to themselves; but still the modification of

cerns truth, and that compares all the objects of thought, and judges of them, is a spring of new ideas."

"Sense," says Professor Whewell, "sees only the outside of things: Reason acquaints itself with their natures. Sensation is only a mode of feeling in the mind; but knowledge implies an active and vital energy in the mind."

Are there not intuitive judgments in the mind, which the mind itself can as distinctly discriminate as it can distinguish instinctive movements (retransmissions) in the body, of which the mind is not conscious?

the sound produced by those vibrations is varied by the material and structure of the instrument itself; and for its expressions of human emotions and passions, it is wholly indebted to the adjustments given to it by the hand or the breath of the performer.\*

Among the strings his fingers stray'd,  
And an uncertain warbling made;  
But when he caught the measure wild,  
The old man rais'd his face, and smil'd.

*Lay of the Last Minstrel.*

Now the organs of sense equally require to be adjusted before any sensation accompanied by distinct perception of an external object can be conveyed to the mind,† and for the animal mechanism by which this is effected (the last link in the corporeal chain), we are indebted entirely to the most acute and indefatigable anatomist and physiologist,

\* "Govern these ventages with your finger and thumb, give it breath with your mouth, and it will discourse most eloquent music." \* \* \* "There is much music, excellent voice in this little organ, yet cannot you make it speak."—*Hamlet*.

† "'Sblood! do you think I am easier to be played on than a pipe?"—*Hamlet*.

the late Sir Charles Bell. In his *Bridge-water Treatise on the Hand*, he has satisfactorily proved that every organ of sense is constructed with an apparatus of muscles so arranged, that, analogous to the adjusting screws, joints, and sliding tubes of the telescope, the eye and the hand, for example, may be moved in any direction in which the mind may have to SEARCH for its object. Now in each of these muscles the fibres of two nerves ramify—one to excite the contractions and give direction to the muscles; the second, to convey to the mind the sensation roused by such contractions. By these pliant means, the adjustments required both for sensation and volition are effected. “Placed between two worlds, the invisible and material, our nervous system conveys cognition from each.” By these important additions to our knowledge of structure and function of the organs of sense, Sir Charles Bell has demonstrably decided a question of deep metaphysical importance, that in sensation the mind is active as well as passive; that as vision (for example) is less distinct in parts of the retina in pro-

portion to their distance from the central point, the mind is roused by an indistinct view of its object to will its movements in SEARCH of a more distinct view of it. Not contented with a sight, it searches for an insight.\*

That this indistinctness of vision occurs in the unadjusted eye, any one may satisfy himself by the following easy experiment:—"If a candle is placed at the distance of ten feet, and a finger is set up at arm's length between the eyes and the candle, when the candle is looked at, the finger will appear double, and when the finger alone is looked at, the candle will be seen double; and the same thing happens with regard to all other objects at like distances which fall within the sphere of vision. In this phenomenon," says Dr. Reid (on the Mind), "it is evident to those

\* Confirmation of this will be found in words wrongly called synonymous, I believe, in every language—we must look before we can see distinctly; we must listen before we can hear (in the Stock Exchange, at least) what any individual is saying; we must handle, before we can feel the texture of a cloth. Though Lady Macbeth's eyes were open, their sense was shut.

who understand the principles of Optics, that the pictures of the objects which are seen double do not fall upon the points of the retina which are similarly situated, but that the pictures of the objects seen single do fall on points similarly situated." It follows from this, that, "when we look at an object, the circumjacent objects may be seen at the same time, although more indistinctly, and this it is which excites the APPETITE of the organ to search for a more distinct and satisfactory sensation."

If, then, there is no error in this inductive process, we may, I think, safely infer, that every organ of sense has its specific excitors. That of the eye, is light; that of the ear, sound; that of smell, fragrance; of taste, flavour; of touch, gradations of pressure; and that when the APPETITE of each sense is once roused, it searches by means of its adjusting apparatus for the object by which it is to be gratified.\*

\* I am persuaded it will be found, on due attention to what passes while any sense is gratified by its appropriate object, that such sense has as distinct an appetite for such object as the stomach for food.

The youth Mitchell, blind, deaf, and dumb, whose case is given with such philosophical accuracy by the late Professor Stewart and Mr. Wardrop, by whom he was couched, passed hours at a time in searching for the light and sound, from which he received impressions too faint to enable him to distinguish definite objects, but still sufficient to gratify the senses which they thus pleasingly excited.

Now all the adjustments essentially necessary for the well-being of an animal are spontaneous—without consciousness—without volition or interference of the mind; and many reciprocally excite each other. As stated in a former page, a dash of cold water on the surface excites the sentient nerves of the skin. The nerves, so excited, induce such change in the spinal cord as to oblige it to excite the muscles moving the ribs. The chest is thus expanded—fresh air is inhaled—that condition is given to the blood on which its vitality depends—and it is now the appropriate exciter of the action of the heart and all the arteries of the body. This I



believe to be the real material source of animal vitality.\*

\* Eggs hatched in ovens become abortive unless supplied abundantly with fresh air and water. Without a continual supply of water from an evaporating basin the constituent water of the egg would be withdrawn by the heated and dry air of the oven, and the organisation of the egg would be destroyed. Without the oxygen of fresh air its vitality during the transition of its structure to that of a bird would perish, as proved by all experiments on suspended animation. I have found that zinc and silver applied to the cut end of a perfectly dry nerve excited no contraction in the muscles to which it was distributed. The sensibility of all sentient nerves is more excitable when wet than when dry. It was probably this appetite for water in Beethoven's sense of touch which so often gave annoyance to his landladies. By imbibition of water, the stricture of the skin confining, when dry and contracted, the sentient extremities of nerves, is relaxed, and oxygen of the air freely admitted. But air without water (as was shown by Dr. Priestley's experiment of dark venous blood becoming bright red when exposed to a current of air in a wet bladder) would not probably impart vitality. This, as well as temperature, should be taken into the account in estimating the effects of baths. The late Baron Larry, in his narrative of Bonaparte's campaigns, gives a vivid report of the exhilarating effects on his vitality produced by the friction and shampooing he so much enjoyed in the baths of Egypt.

But this reciprocal influence exists between the adjustments of different organs of sense. The eye of the sportsman and the fencer directs the hand, as that of the musician his fingers, in their slight and ever-varying pressure on the strings of his instrument.\*

But this exquisite play of adjustments does not end here. Their excitability remains when their palpable objects are no longer present; and the restoration of our adjust-

\* In a paper on the origin of our notion of distance, drawn up from notes left by the late Thomas Wedgwood, Esq., and published in the third volume of the Journal of the Royal Institution, Mr. W. has this observation:—"The invariable conjunction of the notions of touch and sight prevents our ever ascertaining distinctly their separate properties. Hence the one is frequently mistaken for the other—the secondary for the principal."

In another part of the same paper, speaking of our inference of a solid sphere, which we had before felt, from the merely distant sight of the surface exposed to our eye (*i. e.*, inferring the part that we cannot see from the side that we do see), and which thus excites our conception of the whole, he says, "Here, then, is a visual idea, which may be substituted for the tangible magnitude of Berkley."

ments constitutes our memory, our reveries,  
and our dreams.\*

The slightest external touch suffices to  
excite their activity.

“ Lull’d in the countless chambers of the brain,  
Our thoughts are link’d by many a hidden chain.  
Awake but one, and, lo! what myriads rise !  
Each stamps its image, as the other flies ;  
Each, as the varied avenues of sense  
Delight or sorrow to the soul dispense,  
Brightens or fades, yet all with magic art  
Control the latent fibres of the heart.

\* \* \* \*

Each thrills the seat of sense, that sacred source  
Whence the fine nerves direct their mazy course,  
And through the frame invisibly convey  
The subtle quick vibrations as they play.”

*Pleasures of Memory.*

By those who may carefully analyse the  
process of thinking I suspect it will be found,  
that many of our ideas, received as impres-  
sions from external and real objects, are  
merely reiterations of the adjustments which

\* May not the laws of mental association, so fully  
enumerated by Aristotle, and insisted on by Hume, be  
referable to this reciprocal play of adjusting muscles ?

occurred in past sensations, and which have a reciprocal influence on each other's appearance. May it not be of such stuff that our dreams, our reveries, and even our memory is made up? May not this speculation afford some clew to guide our researches into the proximate cause of insanity?

“And slight withal may be the things which bring  
 Back on the heart the weight which it would fling  
 Aside for ever: it may be a sound—  
 A tone of music—Summer's eve—or Spring—  
 A flower—the wind—the ocean—which shall wound,  
 Striking the electric chain wherewith we're darkly  
 bound;

And how and why we know not, nor can trace  
 Home to its cloud this lightning of the mind,  
 But feel the shock *RENEW'D*, nor can efface  
 The blight and black'ning which it leaves behind;  
 Which out of things familiar, undesign'd,  
 When least we deem of such, calls up to view  
 The spectres whom no exorcism can bind,  
 The cold—the chang'd—perchance the dead—anew,  
 The mourn'd—the lov'd, the lost—too many!—yet  
 how few!

CHILDE HAROLD, Canto iv.

I suspect, therefore, that much of our thoughts—much of which the mind is cognisant, and which we habitually refer to the

mind alone—will, on a closer scrutiny, be found to be the mind's perception of the adjustments going on in the body.

In the instance of ocular spectra, Dr. Darwin and Sir David Brewster have adduced most convincing proofs that what had hitherto been considered as phenomena of mind, and solely in the mind's eye, are really no other than reiterated adjustments in the interior of the eye itself—the body's eye (see Appendix); and Dr. Hibbert has as satisfactorily demonstrated that the apparitions which in former times “affrighted nations from their propriety,” and “with fear of change perplexed even Monarchs,” may be accounted for on the same principle of reiteration of sensitive movements from the centre to the circumference of the nervous system—sensations which had first passed from the sentient extremities of nerves on those parts of the circumference which are organs of sense to the centre or brain.

The following passages are taken from an Appendix to Dr. Howe's Report of the Boston Asylum :—

“ The number of persons who have been deprived of both sight and hearing, has been supposed to be very small. There had been but one case upon record, I believe, in England, before that of James Mitchell, mentioned by Dugald Stewart. There has been one noticed quite recently, in France; and there is the well-known case of Julia Brace, at Hartford.

“ But I am inclined to think these melancholy cases are more frequent than has been supposed. I have seen a boy in Rhode Island, who has been deaf, dumb, and blind, since he was four years old: he is now fourteen.

“ There is a girl in Vermont, of whose case I have all the particulars, and who will probably be brought here soon.

“ A correspondent in Ireland has recently informed me, that a very interesting case had been discovered in Belfast, of a little girl

quite deaf and blind. \* \* \* The mother had absconded with her child, preferring the gain which she made by showing her offspring as a monster, to her real welfare.

“ A very melancholy case was recently brought to me for advice. It was that of a boy of very prepossessing appearance, fourteen years old, who, two months before, was in the possession of all his senses, and remarkable only for PRECOCIOUS MENTAL ACTIVITY. He was considered an extraordinary boy, and his mental activity was doubtless the effect of morbid sensibility of the brain, which could probably have been cured by entire cessation of study.

“ Suddenly, his sight began to fail; and in a few weeks he became entirely blind. Hardly had his parents recovered from the stunning influence of this blow, before they remarked with alarm that his head began to be affected, and they brought him to this city (Boston, U. S.) for advice.

“ When I saw him, his hearing was very obtuse; it was necessary to speak in his ears very loud, to make him hear; and addressing

him in this way, seemed like calling to a departing spirit, which was rapidly fading away. His MIND was not affected at all; but it was getting closed up in the body, and as much beyond the reach of other minds, as though his body were in the act of being enclosed in mason-work.

“ I recommended that immediate advantage should be taken of what hearing remained, to teach him the manual alphabet, because, afterwards, it would be a very slow process. This was two months ago, and I have not since heard of him.”

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It is not improbable, that many cases of deficiencies in the organs of sense may have occurred and passed unnoticed. That to which I have alluded, as born and now living at Portsmouth, had remained unnoticed, even by the medical men of the town, till she had passed her 40th year. I attended a meeting of medical men from six neighbouring coun-



ties only a few years ago, and no mention was then made of her.

Since the particulars related in page 5, line 20, were made known to me, I have instituted some further inquiries, and the following is the substance of the answers from a gentleman living near Portsmouth:—

“ Her name is Jane Gill ; her age, about 45 ; she was born deaf and dumb, but not quite blind, but has been blind 40 years ; has remained uneducated from infancy. Her father was a pilot, but has been dead some years. She lives with her brother at Gosport, and is supported by her family. Her touch, smell, and taste are perfect. She is small in stature, was active when a child, is decorous and intelligent, but is not active now, and sleeps much. She used to work and thread her needle with her mouth, but does not do any work now. Her notions of right and wrong, of true and false, appear to be correct. She has no notion of doing to others what she expects from them, and no notions of religion. She is very sensible of any kindness shown to her. If she puts any thing on the

mantel-piece, and does not find it when she goes to it again, she shows her displeasure in a manner not to be mistaken; and if she wishes to give any thing to any one, and they do not take it, she also shows her displeasure, and also her pleasure, if it is taken away."

These, I own, are not very satisfactory notices of the Portsmouth case, but they are all that I have hitherto been enabled to glean.

Some years ago, I saw a Miss Biffin, born with a good head, bust, and trunk, and who had every appearance of intelligence and robust health, with perfect organisation of all her senses; but she had no vestige of either legs or arms beyond the scapulæ. Yet, with the aid of these, her lips, and her tongue, she contrived to thread her needle, and draw and paint flowers and feathers as beautifully as persons who might be considered proficient in their art. ∴

In the summer of 1840, I saw in the Asylum for the Blind at Glasgow a young woman, about twenty, deaf, dumb, and blind, but not from infancy, who not only read em-

bossed print with unhesitating facility, but wrote legibly with equal facility, and corresponded with a blind friend by means of knots made on strings.

In a physiological point of view, the most valuable cases that have come to my knowledge are those of Laura Bridgeman and Julia Brace, in America, and of whom Capt. Basil Hall kindly procured me the official reports. To these, Dr. Howe has most obligingly added many particulars of physiological interest in a letter written in answer to some queries which I had been encouraged by Capt. B. Hall to address to him.

These, and all the instances of blindness and deafness which I have had opportunities of examining personally, or have read from well-authenticated sources, confirm the observations of Dr. Howe and the late Sir Charles Bell, that defective intelligence is not to be inferred from defects in the organs of sense: that they are by no means in a direct ratio to each other. Many of the lower animals have these organs in a state of perfection, to which those of men bear no as-

signable proportion till forced to the cultivation of some by the deficiency of others. Sir Charles Bell's investigation of the functions of the muscular sense led him to conclude, that "the exercise of our muscular frame is the source of much of the knowledge which is usually supposed to be obtained through the organs of the senses; and to this source also we must trace some of our chief enjoyments."

I have already adduced many proofs that it is by the agency of this that all the organs of our other senses are adjusted; and that, till so adjusted as to bring the points of greatest sensibility of the eye, the finger, the lips, and the tongue (at least) to bear on their respective objects, we have no distinct apprehension of them.

By how slight a touch the muscular sense is roused to activity, I have given an instance in poor Sullivan; and Dr. Howe has told us, that the slightest touch of the hand in passing Laura's numerous blind companions in the Asylum sufficed to apprise both her and them, that they had perfectly recognised each other.

It may assist our apprehension of this and similar facts, when we reflect on the innumerable intimations conveyed to the ear by vibrations of the air on the strings of an Æolian harp.

The happiness of persons deprived of organs of sense we may hope is not so much abridged as we might imagine. Laura is as prone to play, and appears always to enjoy it, as much as any of her companions. All the internal feelings which constitute our appetites, affections, emotions, and passions seem to exist in as great perfection in Laura as in others. Many instances are given by Dr. Howe of her keen affection for friends and relatives, and her quick apprehension of the ridiculous.

The peculiarity in the condition of the deaf and blind which has most arrested my attention is the quickness and accuracy of their perceptions through the medium of their remaining senses. Some attribute this to the quickened sensibility in the nerves of their senses. I am rather disposed to attribute it to the necessity of giving a more intense at-

tention of the mind to their remaining sensations, and thus acquiring by practice a more perfect control of the adjusting muscles by which each sense searches for its object. Some have thought that touch alone is active in sensation ; but any one may satisfy himself that this is not the case, if he attends to the efforts made by the other senses while we are testing the less obvious properties of their objects.

On the whole, I think it may be safely inferred, that the blind and the deaf have many and substantial compensations. If debarred from pleasures enjoyed by others, they escape many vexations. One of the happiest, the most intelligent, and the most conversable persons I ever met at table was the late Judge Burton. The born blind may not be fully aware of the pleasures and conveniences they lose ; but he had enjoyed them in their fullest extent.

Few as are the instances cited in these pages of privations of organs of sense, they may still, I think, countenance the inference, that all our knowledge is not derived from

them alone, and that, as Arbuthnot has said in the following beautiful lines, we are really something more than what we seem :—

————— What am I ?

Am I but what I seem, mere flesh and blood,  
A branching channel with a mazy flood—  
This frame, compacted with transcendent skill,  
Of moving joints, obedient to my will,  
Nurs'd from the fruitful glebe like yonder tree,  
Waxes and wastes ? I call it mine, not me ;  
New matter still the mould'ring mass sustains—  
The mansion chang'd, the tenant still remains,  
And from the fleeting stream repair'd by food,  
Distinct as is the swimmer from the flood.

But the argument for the distinct existence of mind is further strengthened by the observation of Professor Dugald Stewart, that all the phenomena of mind differ from all the phenomena of matter ; and of matter, says Professor J. Robinson, we know nothing but its phenomena. They are as distinct from each other as man can conceive of difference. In Laura, we have a decisive proof that intelligence is not directly in the ratio of the senses. With the exception of touch and the

muscular sense, it may be doubted whether she has distinct sensation from any other organ; but her intelligence far surpasses that of many in whom all the senses are perfect.

I found two fine young women in Wales equally deaf and dumb. One had received all the instruction which could be given to her at an asylum. The other had remained at home; yet this surpassed her educated sister in quickness of apprehension and intelligence as much as one individual can evince superiority over another. That MIND does not bear any proportion to the perfection of the organs of sense abundant proof may be found, by all who may hunt for it, in the hawk, the hound, the salmon, and the mountain goat, who measure their leaps with such unerring precision.

If any ordinary measure of distance were put into the hands of Laura, she would be as capable of estimating the distance between its ends as I should be. But she could also imagine its extension to a mile—to a thousand miles—to infinity; for, at whatever distance her imagination might stop, she could



imagine an infinity of distance beyond it. And so of time, by extending any present duration to eternity; for no force of imagination would oppose such a barrier as would not raise the question in both cases—and why not go on? But infinity and eternity are thoughts which the most determined materialist would hardly claim for any organisation of matter!

I think one might proceed a step further, and, by instructing her to feel the pull between a magnet and its keeper, give through her muscular sense even a more perfect notion of power (which also might be extended to infinity) than Locke seems to have acquired; and if these could be annexed to her already well-formed notion of a moral Being, I do not see why the sublime conceptions of a Newton might not be engrafted on the mind of Laura: “*Æternus est et infinitus, omnipotens, et omnisciens, id est durat ab æterno in æternum, et adest ab infinito in infinitum; omnia reget et cognoscit, quæ fiunt, aut fieri possunt. Non est æternitas, et infinitus, sed æternus, et infinitus, non est duratio et spa-*



tium, sed durat, et adest durat semper, et adest ubique, et existendo semper et ubique durationem, et spatium constituit. Deum summum necessario existere in confesso est, et eadem necessitate semper est et ubique."

If due attention be given to the education of the blind, useful hints may be gleaned for the education of others, whose organs of sense have no obstructing defects, and by availing ourselves of Sir Charles Bell's discoveries of the distribution and functions of the nerves subservient to the muscular sense, we may at least teach those more accurate adjustments of the organ of each sense, by which the apprehension of their objects is so much quickened in the blind. Accuracy of adjustment is equally necessary to those who would observe, think, or express. The vivos ducens de marmore vultus must handle his chisel for years before he can hope to rival a Canova, a Chantry, or a Westmacott :

Content with slow and timorous stroke to trace  
The lingering line, and mould the tardy grace.

As my object in this inquiry was to ascertain, if possible, the mental state of the Blind and the Deaf, or, in other words, the disadvantages sustained by the obstructions of these avenues of communication with persons and things external to the body, it may not be deemed superfluous if I give a compressed recapitulation of what may be legitimately inferred from the facts here brought together.

1. That the intelligence is not in any thing like a direct ratio to the perfection of the organs of sense, and that the privations even of a Laura have not occasioned any proportional destitution of knowledge, enjoyment of life, or interest in the welfare of others.

“ We think it would be hard to find a community of young persons, with whom time speeds along more lightly, or to whom he brings less sorrow and more joy, than a school for the blind.

“ The visitor who approaches our house, nine-tenths of whose numerous inmates are groping in darkness, feels a melancholy presentiment that sights of suffering, and sounds

of sadness, must there await him ; but when he has entered, he soon finds that he alone is sad, and that children who sit darkling at their books, or run fearlessly about at their play, are as contented and happy as those whom he left in the enjoyment of sun-light without." \*

Dr. Saergent, of Dublin, told me, that he once found himself at table between two gentlemen, strangers both to himself and to each other. He found that one was deaf, the other blind. When, in the course of the dinner, their defects had become known to him and to each other, they severally deplored the loss which each of them knew the other to have sustained, but expressed no dissatisfaction at their own privations. So true is it, that

" The man that's robb'd not wanting what is stol'n,  
Let him not know it, he's not robb'd at all."

2. That the desire of knowledge and of personal consideration is even stronger in the

\* Dr. Howe's Report of the Massachusetts Asylum for the Blind, for 1842.

deaf or the blind, since they cannot fail to suspect that they may not be justly appreciated, and they feel their need of the assistance and sympathy of others.

For though the fortune of their condition may have barred their way to distinction,

Yet still the self-depending soul,  
Though last and least in FORTUNE's roll,  
His proper sphere commands,  
And knows what *Nature's* seal bestow'd,  
And sees before the Throne of God  
The rank in which he stands.

AKENSIDE.

3. From the difficulty of recalling their impressions, they are naturally more attentive to every passing intimation; and as memory is proportioned to the excitement of the occasion on which our thoughts are acquired, they are consequently more anxious than others to retain what it may have cost them much solicitude to acquire—as men who have earned their fortunes are usually more careful than others who have attained them by inheritance.

Hence, too, I have observed that the infor-

mation of blind or deaf children is less vague than that acquired by others even of the quickest perception. Their knowledge has been acquired from careful examination of objects—that of others (too commonly) only from words, the conventional signs of objects. Any one may satisfy himself by attention to his thoughts in a reverie, when there is no interference of outward objects or his own volition, that they pass in sequences, linked in conformity with well-ascertained laws of the mind.

Now, as the deaf and the blind are less interfered with by external objects, these sequences are less liable to interruption in their minds than in those of others, and consequently they are likely to pass more of their time than others in this sort of mental rumination. It is, therefore, of greater consequence to them than to others that useful subjects should be given for the occupation of their thoughts. For the mind will be occupied by reiterations of past impressions, when not interfered with; and that these reiterations are repetitions of previous adjustments the

following cases have a tendency to prove:—  
 An undertaker was stopped by fever while conducting an ostentatious funeral through Salisbury. When not roused from his delirium, he was incessantly giving hurried and anxious directions to his servants for the disposal of bodies sent to this “atri Janitor dites” for interment.

My friend, Dr. Holmes, of Clifton, allows me to make this use of the following case:—  
 He had the fluid drawn from the head of a boy who had previously lain in a state of insensibility from hydrocephalus. The child, when freed from the pressure of the fluid, began and continued to sing “Cherry ripe.” After a time, the fluid had again accumulated, and the child remained insensible and silent till the fluid was again drawn off. Then the again incessant repetition of “Cherry ripe” perplexed Dr. Holmes and all who heard it even more than before. At length, the boy’s sister recollected that, previously to his illness, he had day after day been fascinated by an itinerant organ, which seldom played any other tune.

It has been reported, that the last words of one of our most distinguished Judges (Lord Tenterden), to an ideal jury, were, " Gentlemen of the jury, are you agreed in your verdict?" or, as another edition has it, " You are discharged."

The well-known instances which Pope has given of the ruling passion strong in death, appear to me mere reiterations of habitually-recurring adjustments. The engine of the body continues to do its work so long as the steam of vitality is kept on.

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It has been shown in a former page, that there can be no correct sensation without correct adjustment, and if no distinct sensation, of course no clear and well-defined thought. Some of the most distinguished men of the present day have therefore instructed students in the several arts how to observe, and thus be enabled to carry out the inductive method of the immortal Bacon.

The late Sir William Herschell has given



a useful detail of the rest and relaxation from all previous adjustments by which he prepared his eyes for astronomical observations. I scarcely need remind the reader, that the pupil of the human eye is found to be more or less contracted not only in proportion to the stronger or fainter light to which the eye is exposed, but also in the ratio of the distance of the object looked at. As the pupil dilates and contracts in ratio of distance, the muscular sense of the pupil measures distance, and the rays of light more or less vivid are the excitors, and thus the eye does measure distance.

The practice of the late Mr. Woodfall, who so long and so faithfully reported the debates in the House of Commons, affords a proof how much the memory gains in efficiency by rest. He is said not to have been in the habit of writing what he had heard till refreshed by a few hours' sleep. All studious men must have observed that the stream of thought is both stronger and more copious after rest than when fatigued.

Mr. Dickens tells us, that when unstrung

by sea-sickness, he could no longer think even for his own amusement, much less for that of others.

Going to a Diorama, all is dark : our pupils having been contracted, and thus adjusted to see by the glare of day, they do not admit light enough to enable us to grope our way through passages unavoidably dark from situation. But after the retina has been less excited, in the darkened room of the diorama, a different adjustment has been effected by the expansion of the pupil, and we are surprised to find all so light on our return, which appeared to have been so dark on our entrance.

Any one may form some notion of the difference of mental feelings in the blind when compared with his own, by giving all his attention to the intimation he receives from touch while groping his way in the dark. This, too, will satisfy him of the intense mental attention which must be given to their corporeal feelings when compared with the vague and superficial view of relative situations of furniture, walls, doors, and windows to those who can see. The blind are careful

to note these. Those who see are less careful to do this, trusting to the ease with which they can be recalled.

It is well known that the pupils of the eyes of cats expand to a wide circle, to enable them to see their prey in the night, and are contracted to a mere chink by the glare of day. A beautiful contrivance for adapting the eyes of hawks, owls, cocks, and water-fowl to different degrees of light was discovered about fifty years ago by my friend, Mr. Smith, and published in the transactions of the Royal Society. Sir Philip Crampton also, without a knowledge of what Mr. Smith had done, made a like discovery in the eyes of water-fowl. It consists of a ring of bony scales, movable over each other by intervening muscles, and thus enabled to give more or less convexity to the cornea, which it surrounds. The neck of the swan, the goose, &c., is thus rendered as subservient to the will of the bird as is the trunk to the elephant. His structure and the acquisition of his food do not require that more senses than those of touch and smell should be placed at the ex-

tremity of his flexible trunk; but aquatic birds, who have to search for their food under water and in mud, require the aid of all their senses, whether for search or notice of danger; and by that benevolent intelligence which with such surpassing skill adapts means to ends, we accordingly find that all the organs of sense are placed at the extremity of the bird's trunk. Analogous to this, faint sounds from distant explosions suggest the distance by suggesting what the sound would be if near. The pull of a kite-string suggests the height to which it has flown—the faint sensation of touch, from the line to which the lead is appended, the depth to which it had been lowered—the fainter smell what it would be if near. But all this is but the play of the muscular sense.

It is generally supposed that we always infer the tangible reality from the visible sign by a law of reciprocal influence between the eye and the hand, so acutely demonstrated by Mr. Wedgwood; but if attention be given to what passes in our minds while looking through a tunnel or the aisle of a cathedral, when, notwithstanding the diminished appear-

ance of the arches approaching the visual vanishing point, which, nevertheless, suggest equality with those nearest to us, we shall find that it is the nearest visual sign of the arches which is suggested by the distant, and not the tangible, since we may never have touched any part of the building.

This may, perhaps, be more readily apprehended by drawing a church, tree, or any large object, as it appears to the eye at different distances. I think it will then be clear, that the visual distant suggests the visual near, and not the tangible, since the effect on our thought is the same whether we have touched the object or not.

It is difficult to satisfy persons who have not made vision a subject of minute investigation that the eye does not measure lineal as well as angular distance; but that it actually does not take direct cognizance of a third dimension, but merely infers it from the luminous sign of the third dimension is well proved by a diorama, Sir J. M. Brunell's toy illusion of his tunnel, and by the following experiment, easily made, by any one with a knife and

a square foot of pasteboard :—Outlines of statues, vases, trees, &c., cut in pasteboard, and left adhering to the sheet ; but so that when held between the eyes and the sun, or a lamp, the light may shine through the cut outline, and be deflected over the surface of the figure, it then presents the most perfect illusion of a solid—so that, if placed in a situation where it could not be touched, and looked at by the most scrutinising eyes of a person totally unacquainted with the real construction of what he saw, he must be disposed to believe that he saw a tangible third dimension, a substantial solid. Yet here there is nothing for the impression it makes but shade fringed with light, deflected on a flat surface.

By experiments made in the Lake of Geneva it was found, that a light refracted from under the water into the air was not visible at a greater distance than three hundred yards ; but that, through the medium of a tube, held from the eye to some feet under the surface of the water, the same light was clearly distinguishable at the distance of

some miles. A bell rung under the surface was heard in air at about the same distance at which the light was seen; but when the ear was applied to one end of a tube, while the other was under the surface of the water, the sound was heard at the distance of some miles.

That odoriferous effluvia do affect the sense of smell more when inhaled through a tube, as by the elephant, any one may satisfy himself, by inhaling the fragrance of flowers through a tube.

In stating the influence of associates to produce excitement (get up the steam to work the human engine) Professor D. Stewart adduced in his Lectures the instance of a boy employed in a manufactory to attend to the opening and closing the valves of a steam-engine. The momentary attention required for this was an intolerable restraint on his propensity to play with the idle boys near him. This strong and incessantly-urging motive to free himself from this restraint (always thinking about it) led him at last to think of the happy expedient of tying the

lever to a part of the engine which opened and shut the valve at the precise moment required, and by this contribution to the improvement of his engine Mr. Watt was not slow to profit. Now the intercourse and influence of a teacher on a boy must be cold, languid, and scanty, compared with that of boys or girls with each other, where the influence of sex is thrown into the scale. The advantage is, in the experienced opinion of Dr. Howe, tenfold.

Men who live much alone or apart from the bustle of life cannot read characters at sight, and mould them to their purpose, as men bred at Eton. No army could be efficient that had no formation but the drill of a parade. If Mr. Fox had been quietly educated in Holland House instead of Eton, or if Gracchus had passed his youth merely in gremio matris, their eloquence never would have so glowed in the forum, or shaken the resolves of people so grave as those of England and Rome.





# APPENDIX.



## APPENDIX.

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### FURTHER NOTICES OF THE CASE OF MARGARET SULLIVAN.

ABOUT the middle of August this year (1843), I had an opportunity of again calling at the Rotherhithe Workhouse, and thus of ascertaining the present condition of poor Margaret Sullivan.

Neither her sight, hearing, nor intelligence appeared to have been improved since I saw her last year ; but she had an air of dejection, which was but too well accounted for when I learned, that the two kind and intelligent girls, her interpreting companions when I last saw her, had quitted the workhouse, and that she was left to the care of persons, I hope not less kind, but still less practised in communications so perplexing and obstructed as even Dr. Howe's would be with one so uncultivated and bereaved as this poor woman. Had her social affections never been roused, and

gratified, she might have felt less acutely the loss of her friends.

“The blind,” says Dr. Howe, “have not less acuteness and strength of the social affections than others, but, on the contrary, these affections seem to be even more developed; and nature, baulked of exhibiting her power in one direction, puts it forth with increased energy in another; or rather (to speak more correctly), they prove that the law of exercise applies to the social as well as to the intellectual faculties: the diminished field for action, as well as the sense of dependence, causes the blind to yearn with more intensity for close social communion with others. This communion becomes very dear, and when its bonds are broken, the sense of desolation is exceedingly keen.”—*Dr. Howe’s 11th Annual Report of the Asylum for the Blind at Boston, 1842.*

Dr. Osborne, in his Report of the state of the Asylum for Pauper Lunatics at Cork, dated March, 1843, states pecuniary distress, domestic dissensions, and loss of relatives, to have been the most active causes in effecting mental impairment. The sorrow felt on the departure and emigration of relatives has disposed many persons to insanity. The mind, in its despondency and grief, excluding all thought excepting those connected with the absence of the lost object of affection, induces a

morbid condition of the body, which in turn reacts, augmenting the mental disturbance, until, under these conjoint influences, the will loses its efficiency in resisting the train of distressing thoughts, and sinks overpowered. Such has been the fate of many aged females consigned to this Asylum.

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PAGE 10, line 4.

As the experiments made by the late Sir Astley Cooper to ascertain the influence of fresh oxygenated blood supplied to the brain by the carotid and vertebral arteries are not accessible to the generality of readers, and are yet of such various and valuable application, I have thought it right to quote a small portion of them here, from the third volume of the Guy's Hospital Reports:—

“ I applied my thumbs so as to compress at the same time the two arteries on each side, taking care to leave the trachea entirely free from compression. Respiration ceased in a few seconds, and the animal appeared dead. The pressure being then removed, the respiration was completely suspended; but artificial motion being given to the ribs, the animal gasped, began to breathe quickly, and recovered.

“ When the par vagum nerves were tied, the lungs were loaded with blood of a dark colour,

and twice as heavy as the healthy lungs;" from which Sir A. Cooper inferred, that the change of the blood is either directly or indirectly under the influence of the par vagum.

"The food in the stomach was not digested."

From all his experiments Sir Ashley infers, that "That the carotids may be obliterated without the destruction of life. The vertebral arteries are much more important vessels, as regards the brain and its functions, than the carotid arteries. The nervous power is much lessened by tying them. The animal becomes dull, and indisposed to use exertion or to take food."

So far Sir Ashley. The obvious inference from this experiment is, that both health and efficient thinking may be impaired if these parts are compressed, as I have often noticed that they have been in labouring people, by too tight a shirt-collar; in soldiers, by too tight and stiff a stock; in persons of a higher grade, more solicitous about appearance than health, by tight neck-cloths and stiffly-padded collars to their coats.

The effect of suspension of vitality of the brain, thus artificially induced by Sir A. Cooper, has so obvious a resemblance to lethargic symptoms, from what is perhaps wrongly called congestion of blood, but certainly from sluggish circulation, brought on by indolence and full feeding, that I cannot but

think the actual state of the circulation is the same in both cases, differing only in degree of more or less sluggish, and consequently that the blood is more or less oxygenated.

Sure I am, that I have often relieved persons from this state by cold water to the head, exercise in the open air, a more abstemious diet, and better-regulated bowels.

The effect of the tremulous motion of a carriage in quickening a languid circulation through the brain is mentioned by Dr. Wollaston in a Cronian Lecture read to the Royal Society, and printed in their Transactions. Of the increased activity of the brain and efficiency of thought from an accelerated circulation, the laughing gas affords the most remarkable instance. But every one must have experienced some degree of this after a reasonable quantity of wine, or even of tea or coffee. That the circulation is thus quickened we may assure ourselves, by the increase of temperature felt externally; but where a part of the skull had been removed, it has been observed by Sir Ashley Cooper and others to suffuse the surface with a blush of red, when excited by passing emotions of the mind.



PAGE 27, line 17.

The following extract is taken from the work already alluded to on *Animal Electricity*, published in 1793:—

I never could perceive, that touch was in the least affected by the metals; but the effect which they produce upon the eye is very remarkable. Having laid a piece of tin-foil upon the point of my tongue, I placed the rounded end of a silver pencil-case against the ball of my eye, in the inner canthus, and suffered them to remain in these situations till the parts were so far accustomed to them, that I could examine the sensations produced; I then brought the metals into contact with each other, and, to my surprise, perceived a pale flash of light diffuse itself over the whole of my eye. My tongue was at the same time affected with a similar sensation to that produced when both the metals are in contact with it. On darkening the room, the flash became more distinct, and of a stronger colour. This sensation is not the effect of pressure upon the eye, as in Sir Isaac Newton's experiment; for no pressure should be used. All that is required, is, that the silver lie between the lids of the eye, and in contact with any part of the ball. If the experiment be made with zinc and gold, instead of tin-foil and silver,

the flash is incomparably more vivid. I had the disagreeable opportunity of trying this experiment upon one of my eyes, in a state of inflammation ; and in this case found the flash much more strong than it was in the uninflamed eye. I tried it likewise upon a patient affected with amaurosis ; but the man was so stupid, that I could not satisfy myself as to the precise result.

Recollecting that fine nervous twigs pass from the ciliary or ophthalmic ganglion, through the sclerotic coat of the eye, to the choroid coat and to the uvea, and that this ganglion is in great part formed from a twig of the nasal branch of the fifth pair of nerves in conjunction with a branch of the third, I proceeded to try if, by insinuating a rod of silver as far as possible up my nose, and thus arming this nasal branch, I could, by bringing the silver in contact with a piece of zinc, placed upon my tongue, pass this new influence up the course of the nerve, and thus produce the flash in the eye. The experiment answered my most sanguine expectation. The flash, in this way produced, is, I think, if any thing, stronger than when the ball of the eye itself is armed. I now thought I had discovered a certain method, by which I could ascertain the effect of Galvani's influence, upon a very important, involuntary muscle, the human iris.

I therefore desired some of my friends to observe my pupil, while I repeated the experiment, which I have above described. When the external light was strong, they found some difficulty in determining, whether the pupil contracted or not; but when no more light was admitted than what was just sufficient for discerning the pupil, they perceived a very distinct contraction, every time the metals were brought into contact with each other. This experiment requires some attention, in order that it may succeed satisfactorily; but although I have repeated it a number of times upon the eyes of others, it has seldom failed, when made in a steady light, and when the silver has been passed far enough up the nose.

My friend, Mr. George Hunter, of York, while one day amusing himself with repeating some of these experiments, discovered that by placing one of the metals as high up as possible between the gums and the upper lip, and the other in a similar situation with respect to the under lip, a flash was produced as vivid as that occasioned by passing one of the metals up the nose, and placing the other upon the tongue. It differs, however, from the flash produced in any other way, in the singular circumstance of not being confined to the eye alone, but appearing diffused over the whole of the face. On attending to the concomitant sensations pro-



duced by this disposition of the metals, I perceived that a sense of warmth, at the instant they were brought into contact, diffused itself over the whole upper surface of the tongue, proceeding from its root to the point. Dr. Rutherford, to whom Mr. Hunter had communicated this experiment, remarked, on repeating it, that a flash is produced not only at the instant the metals are brought into contact, but likewise at the instant of their separation. While they remain in contact, no flash is observed.

One of the conjectures as to the source of animal heat is, that its evolution is effected by the nerves; and many experiments have appeared confirmatory of this supposition. The agency of the nerves in effecting the evolution of animal heat may, I think, be inferred from the increase of our temperature by emotion, and the suspension of its evolution, when the eighth pair were divided or compressed by Sir A. Cooper.

If I might be allowed to hazard a conjecture, where we cannot have recourse to demonstration, I should say that the flash, observed in the above experiments, was the effect of contractions excited in involuntary muscles by the application of a stimulus to their nerves; or, in other words, that the effects of the application of the metals to the nasal branch of the first divi-

sion of the fifth pair of nerves, had been propagated through the ciliary ganglion, along the ciliary nerves, and to the choroid coat, whose vessels it had excited into instantaneous action ; and that their action again (as in the case of action excited by pressure, or a blow upon the eye), had, by stimulating the retina, occasioned the sense of light.

This supposition is, I think, rendered probable by several considerations. I have already shown that this influence can excite contractions in involuntary muscles, through the medium of their nerves. And certainly no reason can be assigned *a priori*, why it should not act equally upon every description of involuntary muscles ; upon those which make a part of the minutest vessels in the body, as well as upon the heart, or upon the iris.

That it excites to increased action the arteries of the tongue in the experiment, in which a sense of warmth is produced along its surface by the application of the metals to the lips, seems to be almost demonstrated ; for it would be difficult to point out the presence of another cause competent to occasion the evolution of the heat, in this case, besides the increased action of the arteries ; and that this cause is competent to the effect we know from numberless experiments, too familiar to need being particularised here.

That the flash is the effect of such an increased action of the vessels, composing the choroid coat, might be somewhat more difficult to prove. It is, however, known to every one, that a blow, and that pressure upon the eye, are capable, as I have before observed, of producing a similar effect. And the following case, which Bonetus quotes from Hermannus Cummius, if it may be credited, affords an almost positive proof, that vision depends upon the stimulus given to the retina by the activity of blood-vessels in some part of the eye. "*Quando theologus, plaga dolorifica, a rupta instrumenti musici chorda accepta, nocte subsequenti jam adulta, e somno evigilans, cuncta clare, ac si de die esset, vidit, adeo, ut minimos picturarum et tapetum tractus observare, characteresque ex libro legere posset. Oculo vero læso clauso, tenebras densissimas adesse ille percepit, eodemque iterum aperto, conclave illustratum visum est, lucem tamen candelæ allatæ solisque splendorem de die, ægre tulit oculus affectus, quod per aliquot dies duravit, tandemque sensim remisit.*"

I have often seen distinct corruscations of pure yellow light, apparently in branches of the fifth pair of nerves of the left side of my face, whenever, being in the dark, a loose tooth (one of the cuspidati) was unwarily pressed against the roof of its

socket ; but I certainly never saw external objects by this light.

Sir Charles Bell, in his work on the Hand, page 174, states, that an officer received a musket-ball through the bones of his face. He said he felt as if there had been a flash of lightning accompanied with a sound like shutting the door of St. Paul's.

Haller speaks of such cases as by no means uncommon, and quotes the names of several authors who have related similar ones.

PAGE 46, line 12.

While making some physiological experiments suggested by Galvani's then recent discovery of what was supposed to be animal electricity, the following fact attracted my notice, and strongly and permanently impressed on my attention the useful subserviency of water and friction for the preservation and restoration of health.

When a nerve, which for some time has been detached from surrounding parts, is either carefully wiped quite dry with a piece of fine muslin, or (lest this should be thought to injure its structure), suffered to remain suspended till its moisture has evaporated, no contractions can be excited in the muscles, to which it is distributed, by touching it alone with any two


metals in contact with each other. But, if it be again moistened with a few drops of water, contractions instantly take place ; and, in this way, by alternately drying and moistening the nerve, contractions may, at pleasure, be alternately suspended and renewed for a considerable time.

M. Fontana, in the first volume of his work on poisons, mentions some facts, which may, to some, appear to give considerable countenance to this explanation. The microscopical eels found in dry and smutty wheat ; the *Seta equina* or *gordius* of Linnæus ; and the wheel polypus, all, when dry, become apparently dead, but again recover motion and life when moistened with water. One of the latter was put, by M. Fontana, upon a bit of glass, and exposed, during a whole summer, to the noon-day sun. It became so dry, that it was like a piece of hardened glue. A few drops of water, however, did not fail to restore it to life. Another was, in this way, recovered after a similar exposure of a year and a half. Father Gumillo, a Jesuit, and the Indians of Peru, are quoted by the same author, on the authority of Bonguer, as speaking of “ a large and venomous snake, which being dead and dried in the open air, or in the smoke of a chimney, has the property of coming again to life, on its being exposed, for some days, to the sun, in a stagnant and corrupted water.”



But it would almost require the credulity of an Indian to credit the testimony of the Jesuit.

The men who work in the deep copper and tin mines of Cornwall, seldom retain sufficient health to enable them to continue their employment beyond the age of 40 or 45 ; while in the equally deep coal-pits of Durham (I was told) men are to be found who have retained their strength even to their 70th year. This difference appeared to me to be occasioned, not so much by any deleterious effluvia from the copper, as by the exhaustion produced by fasting too long in the mine, and then, after many toilsome hours in damp, confined, and impure air, having to climb a succession of ladders for nearly an hour, before they could reach the surface. To this cause, I think the difficulty of breathing (with which all above the age of 35 seemed to be more or less affected) must be attributed. I felt the pulse of three young men a few minutes after they had emerged from a mine. It was in all feeble and hurried, and their respiration was laborious. They were in a profuse perspiration, and appeared so exhausted as to require long repose, and wholesome food, to restore their strength and efficiency. But in this state, unwashed and unrefreshed by food, they had to walk long distances to their homes. The Durham pit-men, on the contrary, are lifted from



their work by a steam-engine, and are well washed before they feed or repose.

This most salutary preservative of health (washing) is forced upon even the most indisposed of the pit-men in coal-mines, by the coal-dust retained on the whole surface by the perspiration which the confined situation of their work has rendered profuse. By this effective application of water and rubbing, the skin is restored to that active and imbibing state in which alone it can aid the lungs in giving oxygen access to the blood.

Till means can be devised for sparing men the fatigue of climbing from the Cornish mines, much might be done towards the preservation of their health, if the precautions of tepid bathing, refreshment, and even half an hour's repose could be provided for them, either before they leave the premises of their employers, or immediately on their return to their homes.

PAGE 50, line 10.

I was surprised, says Dr. Darwin (*Zoonomia*, vol. i., p. 564), and agreeably amused by the following experiment:—"I covered a paper about four inches square with yellow, and with a pen filled with a blue colour wrote on the middle of it the word Banks, in capitals, and sitting with my back to the sun, fixed my eyes for a minute

exactly on the centre of the letter N, in the middle of the word. After closing my eyes, and shading them somewhat with my hand, the word (Banks) was distinctly seen in the spectrum in yellow letters on a blue field, and then, on opening my eyes, on a yellowish wall, at twenty feet distance, the magnified name of Banks appeared written on the wall in golden characters."

If we look intently on a window for a minute in a cloudy day, and then close our eyes with the hand, still continuing to look in the same direction, a spectrum of the window and its bars will be seen, with the light and dark parts reversed; for the bars in the spectrum will be light, and the panes of glass dark. Both my eyes are dim from incipient cataracts, and to me each bar appears as double—that is, with the distance of an inch or more between the real bar and a second much fainter. When I incline my head to either side, the fainter bar approaches the real, till they form one line—analogous to the appearance of a line seen under a rotating Iceland crystal.

Both these experiments succeed best early in the morning.

A proof that this spectrum is certainly in the body's, and not the mind's eye, is, that it gradually disappears, whatever effort we may make to retain it.

“It was observed in the learned Mons. Sauvage’s Nos. Meth., that the pulsations of the optic artery might be perceived by looking attentively on a white wall well illuminated ; a kind of net-work, darker than the other parts of the wall, appears and vanishes alternately with every pulsation. This change of the colour of the wall he well ascribes to the compression of the retina by the diastole of the artery. The various colours produced in the eye by the pressure of the finger, or by a stroke on it, as mentioned by Sir Isaac Newton, seem likewise to originate from the unequal pressure on various parts of the retina.”

May it not be inferred from this and analogous facts adduced by Sir David Brewster, Dr. Hibbert, and others, that what has hitherto been considered the mind’s eye is really the body’s eye, and that some (at least) of our thoughts may be excited by reiterations of the adjustments strongly formed during previous sensations ?—and if this be so, it may be worth the consideration of those who engage in plans of practical education, whether more may not be permanently fixed in the mind by well-devised exercises of the adjustments of the organs of sense, than by confining the attention of their pupils to loading their memory with mere words—not always well defined, or susceptible of being clearly understood, even by themselves. In training

for the arts of life, an opposite course is invariably followed; and no one is so absurd as to suppose that the seaman or the soldier, the sculptor, the musician, or the manufacturer could be formed by merely verbal instruction, however clearly or frequently repeated; yet it is by words alone that instruction is given to the youth who may be called on to officiate in our temples, or to bear his part in the councils of his country. It is at his play, and only during his play, that his hand and his eye and his ear have opportunities afforded them of working in concurrence with his mind. It was not by such a course of training that a Michael Angelo or a Galileo were trained to excel all who had existed before them—nor, in our own time, a Franklin, a Hunter, a Herschell, a Davy, a Bell, or a Watt.

Whenever a stranger was spoken of to the late Dr. Wollaston as a man noticed for his intelligence, his invariable question was, “Has he hands\*?”

\* “The impact of a cube against the hand of a child who has never yet seen his hand, and the impact of a cube against the coat of the stomach, seem equally incapable of giving any notion of magnitude or figure; and the superiority of the hand above other parts of the body in suggesting these notions is owing entirely to the more numerous visual ideas which our habits have connected with it. The hand is indeed the most convenient organ of touch; but if, from accident, other parts of the body are much exercised in its stead, we

Most impartial and competent judges of the proficiency of children under different plans of instruction have assured me, that the blind, who acquire a knowledge of words by their fingers alone, learn quicker and are more retentive of what they have learned than those who learn by the eye ; and what I myself have been told and have seen in asylums for the blind, in Glasgow, Liverpool, and London, has satisfied me, that this estimate of difference has not been exaggerated. In the asylum for the blind at Glasgow there is a young woman, perfectly formed and intelligent, but both blind and deaf. She read with her fingers, and then wrote what she had read as quickly, correctly, and legibly as any person of her age and station would have done with the most perfect sight. She was in frequent correspondence with a distant friend, equally blind with herself, and their thoughts were conveyed to each other, not by writing, which other persons might have read, but by knots made of twine ; and these cumbrous and seemingly-intricate letters, I was

find that they acquire much of that delicacy of touch which is usually peculiar to the hand."—(From a paper by Mr. Wedgwood, already quoted.)—Yet the born blind, who consequently never can have seen their hands, soon learn to judge of form and distance, and, as Laura Bridgman, to substitute the hand for the other organs of sense, which are in her all defective.

told, sometimes form a parcel of considerable bulk. It is an interesting fact in the history of mind, that two young women, to whom the method of recording events said to be in use among the North American Indians was not likely to have been known, should have been prompted, merely by the natural desire of confining their thoughts to their own bosoms, to have hit upon this very identical expedient.

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There still remain many curious peculiarities in the mental state of the Deaf and the Blind unnoticed in these pages. But I forbear to extend my observations on them here, as they might not appear attractive to any, but the few, to whom researches into the operations of our minds are familiar, and who might feel an interest in tracing the physiological part of the process by which our thoughts are formed.

THE END.

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